

SEQUENTIAL SEARCH

Beyond doubt, the simplest way to do a search is to begin at one end of the list and scan down it until the desired key is found or the other end is reached.

```
#include "stdafx.h"
#include <iostream>
#include <ctime>
using namespace std;
void main()
{
    int k;
    int size=10;
    int myarray[10] = {12,4,5,3,18,7,9,11,14,10};
    cout << "Enter number : ";
    cin >> k;
    for(int i =0;i <size; i++)
    {
        if(k == myarray[i])
        {
            cout << i << "\n";
            exit;
        }
    }
}
```

Under the assumption of equal likelihood we can find the average number of key comparisons done in a successful sequential search. We simply add the number needed for all the successful searches, and divide by n , the number of items in the list. The result is

$$\frac{1 + 2 + 3 + \dots + n}{n}.$$

The first formula is

$$1 + 2 + 3 + \dots + n = \frac{1}{2}n(n + 1).$$

Hence the average number of key comparisons done by sequential search in the successful case is

$$\frac{n(n + 1)}{2n} = \frac{1}{2}(n + 1).$$

Binary Search

```
#include "stdafx.h"
#include <iostream>
#include <ctime>
using namespace std;
void main()
{
    int k;
    int size=21;
    int bottom=0;
    int top=size-1;
    int mid=0;
    int end_flag=0;
    int myarray[21]=
        {2,4,6,8,10,12,14,16,18,20,22,24,26,
         28,30,32,34,36,38,40,48};
    cout << "Enter number : ";
    cin >> k;
    while(bottom<top)
    {
        mid=(bottom+top)/2;
        if(k==myarray[mid])
        {
            cout<< "found at " << mid <<"\n";
            end_flag=1;
            break;
        }
        else if(k<myarray[mid])
        {
            top = mid;
        }
        else if(k>myarray[mid])
        {
            bottom=mid;
        }

        if(top==bottom+1)
            break;
    }
}
```

For both sequential search and binary search:

Find the number of comparisons of keys for

- (a) unsuccessful search.
- (b) best successful search.
- (c) worst successful search.
- (d) average successful search.

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